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The geological map project of the Carnic Alps: selected areas with Devonian-Carboniferous sequences

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The rationale of the project of geological mapping of selected areas within the Pre-Variscan succession of the Carnic Alps is an outcome of the formal definition of the lithostratigraphic units (Corradini & Suttner, 2015). The goal is to correlate the sequences located in different parts of the basin in order to precisely define timelines and lateral transitions to constrain the basin evolution between Pragian and Visean.

The Carnic Alps, located across the boundary between northeastern Italy and south Austria, represent one of the classic areas of study of the Paleozoic in Europe and correspond to the non- to low-metamorphic portion of the Variscan substratum of the Southern Alps. The Upper Ordovician to Upper Carboniferous succession represents the best-preserved example of Variscan succession within the Alps. The Pragian to Frasnian stratigraphic interval is characterized by the differentiation of the basin in shallow water, including carbonate buildups, and pelagic parts, and the so-called 'transitional facies' represent a sort of 'connection' between these two parts. We focused mostly on these latter facies, because they 1) reflect well the depositional dynamics; 2) are datable using conodonts, unlike the shallow water units; 3) are less subject to tectonic elisions/repetitions than the basin units.

We performed geological mapping, measured stratigraphic sections of all the units and dated by conodonts all the lithostratigraphic transitions, in order to infer the lateral correlations throughout the

basin. Correlations are also supported by some marker beds/levels. The structural setting is characterized by thin-skinned tectonics reflecting extensional as well as compressional events of both Variscan and Alpine age (i.e., Venturini, 1990). Nevertheless, the stratigraphies are well preserved and generally well exposed.

We distinguished between proximal and distal 'transitional facies'. The succession of the proximal 'transitional facies' is shown in the excerpt of the geological map of Fig. 1.

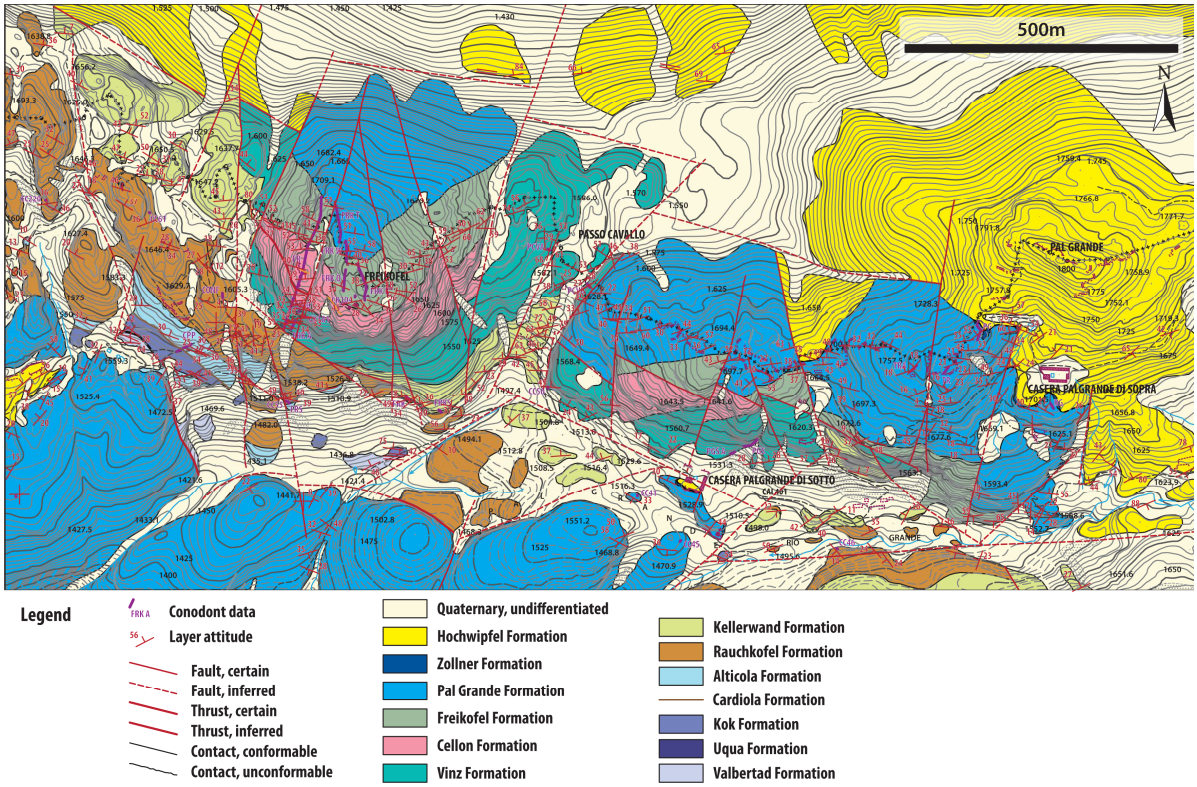

Figure 1. Geological map of the area around Mt Freikofel. Here the succession of the proximal 'transitional facies' is exposed.

The succession starts with the transgression of the Kellerwand Fm. on top of the Rauchkofel Fm. at the base of the Pragian. This transition most probably reflects the Lochkov–Prag Event (Suttner & Kido, 2015). The Kelletwand Fm. (Pragian-Emsian) consists mostly of wackestone to packstone interbedded with minor levels of fining upward packstone-grainstone and crinoidal-bearing grainstone. Only in the uppermost part of the unit beds of coral-bearing rudstone are present. This unit gradually passes upward to the Vinz Fm. (Emsian Givetian) which shows the same lithologies but the coral-bearing rudstone become increasingly dominant. This coarsening upward trend continues up to the Givetian with the deposition of the Cellon Fm. that consists only of very thick bedded rudstone. From the uppermost Givetian, with the deposition of the Freikofel Fm., breccia beds become different (different depositional processes, low occurrence of reef-builder debris and reworked fauna) probably reflecting dismantlement of the platform (Pas et al., 2014).

The succession of the distal 'transitional facies' is shown in the geological map of Fig. 2 (Pondrelli et al., 2015).

In these parts of the basin the first lithoclastic beds are the allodapic layers found within the mud- to wackestone beds of the Finding Fm. from the upper Emsian. The Finding Fm. passes upward to the Hoher Trieb Fm, that consists of corals-bearing rudstone and floatstone beds interlayered with pack-/grainstone, wackestone, cherts and black shales beds, whose deposition spans up close to the Givetian-Frasnian boundary.

These successions and their correlation suggest the presence of a transition between a ramp-type and a rimmed shelf-type profile during the Emsian. The evolution of the basin appears to reflect global trends at least up to the Givetian.

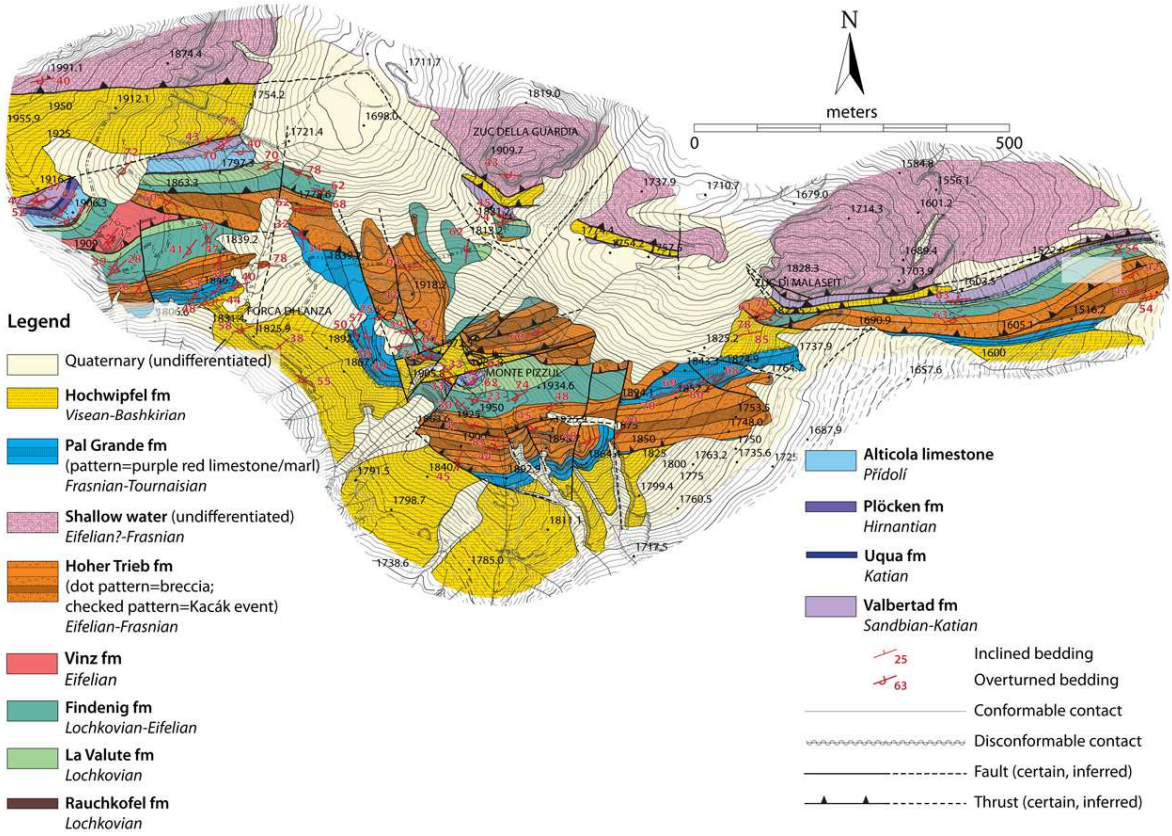

Figure 2. Geological map of the area of Mt Pizzul (Pondrelli et al., 2015). Here the succession of the distal 'transitional facies' is exposed.

Original Project title

The geological map project of the Carnic Alps.

Project leaders, funding agency, duration

Pondrelli, M., research grants of the participants, long-term project.

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